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• The Physical Examination of •
• Infants and Young Children •

• THERON WENDELL KILMER M.D. •

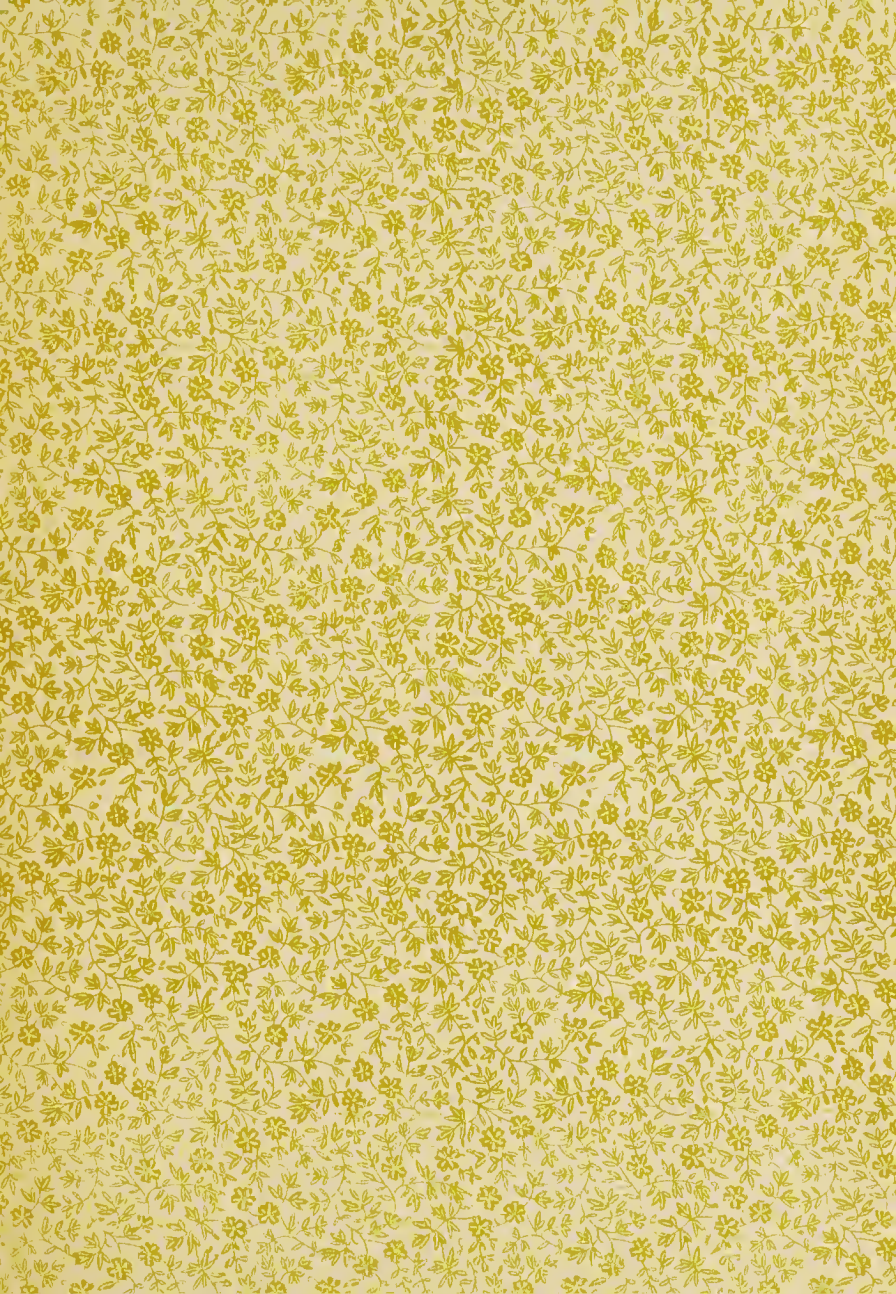
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THE PHYSICAL EXAMINATION
OF
INFANTS AND YOUNG CHILDREN

KILMER

THE
PHYSICAL EXAMINATION
OF
INFANTS AND YOUNG CHILDREN

BY

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TO THE SUMMER HOME OF ST. GILES,
GARDEN CITY, NEW YORK.

Illustrated with 59 Half-tone Engravings



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TO
CHARLES GILMORE KERLEY, M.D.
PROFESSOR OF DISEASES OF CHILDREN IN THE NEW YORK POLYCLINIC MEDICAL
SCHOOL AND HOSPITAL

THIS LITTLE VOLUME
IS RESPECTFULLY DEDICATED AS A TRIBUTE TO HIS SKILL
AS A PHYSICIAN AND HIS STERLING QUALITIES
AS A MAN, BY
THE AUTHOR.

PREFACE.

THE physical examination of infants and young children is a subject in which nearly all the text-books on pediatrics are deficient. The training of most physicians has been along the lines of the physical examination of the *adult*, and it is in the knowledge of the physical examination of children that the average practitioner is deficient. We must forget and unlearn all the things we ever knew about adults when we come to the examination of children: they are an entirely different proposition. The great secret in the treatment of disease is to first make a correct diagnosis.

It has been the author's privilege to watch hundreds of students, chiefly in post-graduate schools, examine infants and young children, and the deplorable ignorance of most physicians as to the methods of examination of babies has led the author to write the following little volume.

The author makes no pretense as to outlining physical diagnosis nor pathological conditions of any kind whatsoever; his only aim is to instruct the student and physician how to examine a baby. If he has accomplished this end, he will rest satisfied.



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THE PHYSICAL EXAMINATION OF INFANTS AND YOUNG CHILDREN.

INTRODUCTION.

THERE are three classes of babies which the physician will be called upon to examine:—

1. The baby that will let you do anything to him that you wish, that will let you handle him to your heart's content, that will seem to enjoy having his chest auscultated and percussed. Such a baby is a treasure to the examining physician.

2. The nervous, excitable, and timid baby—a baby that has been reared in a family of a highly neurotic character, a baby that has never been allowed to cry for fear that crying might injure him; the family have never spoken any words but whispered ones, nor has anybody been allowed to walk but on tiptoe in the room where this precious baby has sought slumber. Is it any wonder he is nervous? The examination of such a baby requires patience. You will be obliged to proceed slowly with the examination of such a patient, approach him gradually, let him get accustomed to your presence by degrees, let him handle your stethoscope and find out for himself that you mean no harm. Get his confidence

and do not abuse it after you do get it. Do your work thoroughly and not in a hurried, jerky way: take time. I have often found that a few words of assurance to such a baby, even though he may be a young infant, spoken in a soft, kind voice, will do a great deal to calm the troubled spirits of these nervous, excitable, timid children.

3. The spoiled child—the vicious child. There is a great difference between this class and the second class above mentioned. These are infants, and children mostly over a year old, that have had their own way since birth. They are the pets of the family, probably an only child. They will yell at, kick, bite, and scratch any physician who attempts to examine any part of their body. With these children to examine is it any wonder that the attending physician, in answer to the question of the consulting physician if there is anything in the throat, replies: “I could not get a view of the throat: the child struggled so.” Waste no time about the examination of this class of patients. Begin your examination at once and never for a moment consider the child’s whims or wishes. Mamma thinks that, possibly, if you let *her* hold the spoon, you can look into Willie’s throat far better, than if you depress the tongue yourself. Papa suggests that if you would only let *him* place the thermometer in the rectum, Willie would not kick and bite “half as much.” Do your own work, and let the child know that, although you mean no harm to him,

yet you expect to be obeyed. It will do you no good to try to reason with such a child. A little reasoning to commence with is all very well, but with a child, after he has once passed the bounds of reason, it is useless to delay.

Did you ever watch an animal trainer train a vicious, untamed horse? If the trainer wishes to train this horse not to be afraid of a steam whistle, what does he do? Does he at first lead the animal up to the steam whistle, talking to him all the time? No. The trainer's first procedure is to *throw* the horse, crack a whip several times over him, and then tell the horse to stand up! That horse is now a different animal. The trainer has demonstrated by this simple procedure three facts, that an animal mind (whether horse's or baby's) must comprehend: 1. Respect. You must respect me, I am your superior and have the power to *make* you do as *I will*. 2. Confidence. The trainer cracks the whip—I will make you do nothing that will harm you; I *could* hurt you with this whip, but I will not, unless you do wrong. This procedure inspires confidence. 3. Obedience. The trainer tells the horse to get up; the animal does so. Here we have obedience. Now, when the trainer drives that same horse up to a steam whistle, blowing full blast, what is it that has wrought this miraculous change—from a cowering, cringing, vicious horse to a horse that is practically fearless? The animal acknowledges his trainer as his superior and *respects* him, he has *confidence* in his master—he *obeys* him.

Pardon this seeming sidetrack from our subject, but it is, nevertheless, the keynote to success in the examination and management of children. Never deceive a baby. He will never forget it. If you are going to hurt a baby, tell him so. If you are not going to hurt him, tell him so. Why is it that nine out of ten babies are afraid of a doctor? They have been deceived at some time in their little lives by some well-meaning physician and they have never forgotten it. They have possibly been told, when you were about to open an abscess or vaccinate them: "Oh, this will not hurt you;" and then, after they have given you their confidence, you abuse it by the basest of all deception and plunge a knife into an abscess or scarify their arm. You have *lied* to them; they know it and will *never* forgive you. It is well for the physician to at once get on good terms with his little patients. I never go into a sick-room without having first ascertained from parents or nurse the child's first name, or whether he is called a pet name by any member of the family. It makes all the difference in the world, when a physician who is making his first visit to a child patient and comes into the sick-room saying that old, stereotyped, meaningless expression: "How do you do, my little man?" or whether he comes in and cheerfully says: "Hello, Tom!" or calls the child by some family pet name. There is absolutely nothing in the expression: "How do you do, my little man," to inspire respect, confidence, or obedience. But when a child hears

his own name called out in a familiar manner by one whom he never saw before, he becomes acquainted much quicker. Children make snap diagnoses of their attending physicians, and it depends upon how you act the first few minutes, whether they are to like you or dislike you. Therefore, I reiterate the importance of at once getting on good terms with your children patients.

THE CRY.

Accustom your ear to crying babies. Do not let their crying bother you. A physician who is not "deaf" to crying babies will never make his mark as a children's specialist; and yet he must, on the other hand, be an expert in the art of differentiating the various cries that a baby makes. Are they all alike? No! How often do I hear the remark upon asking a student what he heard upon auscultating a baby's chest: "The baby cried so—I could not hear anything." The fact of a baby crying should make no difference to the trained ear of the examining physician. He should be able to detect pathological conditions, especially in the lungs, even though the patient should cry his loudest. My experience has led me to believe that there are eleven reasons why a baby cries. They are as follows:—

1. He is hungry.
2. He is thirsty.

3. He is in pain.
4. He wants attention.
5. He is sleepy.
6. His napkins are wet.
7. He is tired of lying in one position.
8. He is frightened.
9. He is exhausted.
10. He is crying from temper.
11. His clothing is uncomfortable.

HE IS HUNGRY.—The cry of hunger is a continuous one, accompanied by sucking of the fingers; the crying stops immediately when baby gets his food.

HE IS THIRSTY.—The cry is generally continuous and stops when baby gets a drink of water.

HE IS IN PAIN.—If in pain from a pin pricking him, the cry is sharp and continuous; if from colic, the cry is spasmodic accompanied by throwing up of the knees and turning the thumb inside the closed fingers. Earache and teething are frequent causes of cries from pain.

HE WANTS ATTENTION.—Baby very soon finds out that he likes attention. When he is laid down alone, or the mother or nurse goes out of his sight, he sets up a cry for renewed attention. He wants to be cuddled, or rocked, and if he does not get just what he wants, he will cry. His crying is immediately stopped when he is taken up, held, or rocked. Oftentimes, as soon as he

sees his mother coming to him, his cries will cease; in other words, he is rapidly becoming a spoiled baby. We often hear the remark made by some dear, old grandmother or loving mother: "Oh, he will grow out of it, or wait until he grows a little older and understands what you say to him." But if you *do* wait a few months, you are lost. Begin when a baby is born to make him understand that you mean what you say. *You* are the one to be obeyed; it is for your child's good.

One of the hardest trials of a young mother's life is to hear her baby cry and not to give in to him; but after . . baby has cried it out two or three times, he soon finds that no matter how hard he cries, no one seems to care; so he stops crying. Oftentimes, one good "cry it out" will be all that is necessary. If a baby is not born with a rupture and wears a good, firm, supporting band, there is absolutely no danger of crying causing a rupture.

HE IS SLEEPY.—A baby will often fight against going to sleep. He will cry a few cries, until his cries become weaker, and with a little moan or a long sigh baby is asleep.

HIS NAPKINS ARE WET.—When a baby cries, always examine his napkins and change them, if they are at all damp.

HE IS TIRED OF LYING IN ONE POSITION.—In very young or weak babies who are unable to change their position themselves we find that changing their position

and laying them on the other side often stops their crying.

HE IS FRIGHTENED.—Babies from six months to two years old will often wake up when they find themselves in a dark room, or after a bad dream, and cry out in a shrieking voice. They should be taken up or talked to in a soothing way, and placed back in bed again. This generally suffices.

HE IS EXHAUSTED.—Crying from this cause is usually a low moaning cry and is heard in very ill or weak babies.

HE IS CRYING FROM TEMPER.—This form of crying is seen in older children. They cry loudly, swinging their arms and kicking their feet. Tears are supposed to be seen in babies who are crying from pain, but they often cry real tears from nothing but temper. Tears do not usually show themselves until after the baby is two and a half to three months old.

HIS CLOTHING IS UNCOMFORTABLE. — Often the baby's band or napkin becomes wrinkled and hurts him. Take him up, straighten his clothes, and he will stop, if the crying was occasioned by uncomfortable clothing.

A young infant cries quite a little. It is healthful for him to cry. It is part of his daily exercise. If a baby cries, go over the list of causes that are above enumerated and if he is crying only because he wants attention, let him cry it out.

HISTORY.

Of all importance is the history. It is always well to get a history of the case before seeing the child, for often if you wait until you are ushered into the sick-room of a nervous, excitable child, he will make such a rumpus that it will be next to impossible to learn any of the history, and a crying child is not the best means of concentrating a mother's thoughts on any antecedent events. Therefore, get the history before seeing the patient, if possible. Let the mother tell you the history of the case in her own words. I remember not long ago getting the history of a patient with chorea, whose mother said: "Doctor, the twitchings came out of the rheumatism." Now, that is a terse history of a case of chorea following a rheumatic attack, expressed in words which we all understand and which are right to the point. Do not interrupt the mother's story of the case, unless she begins to tell you of irrelevant things. When the mother has finished giving you the history of the case, then ask a few well put questions.

It is also important to go into the history of the parents as well as of the child. Keep a sharp lookout for any history of rheumatism, heart disease, tuberculosis, and miscarriages (syphilis). There should always be a written history of each case. In both my hospital and private practice I have history cards of each case, as follows:—

FRONT OF CARD.

Disease

Name, *John Jones.* Malnutrition. Date *January 1, 1904.*Address, *400 Smith Avenue.* Age, *11 months.***Family History:** *Father died of phthisis. Miscarriages: 1 (at 3d month).*Children Living, *4.* Dead, *1.* Cause, *Pneumonia.***Previous Illness,** *Whooping Cough when 6 months old. Full Term, Yes.***Diet from Birth,** *Nursed Breast 2 months, then given whole milk (mother had sore breasts). Fed whenever baby cried. Now fed whole cow's milk, bread, potato, soup.***PRESENT COMPLAINT.** *Vomits after each feeding. Does not gain in weight. Costive. Attacks of colic. Poor appetite. Cries all the time.***PHYSICAL EXAMINATION.** *Poorly nourished. Muscles flabby. Pale. Liver 1 inch below. Spleen not felt. Has two teeth. Intertrigo of buttocks. Chest negative. Temp. 99. Weight, 12 pounds 3 ozs.*

*Jan. 1, 1904. Stomach washed (mucus and curds). Calomel, gr. $\frac{1}{15}$
q. $\frac{1}{2}$ h. for 10 doses. Put on $\frac{1}{2}$ Cow's Milk and $\frac{1}{2}$ Barley
Water. 8 ounces every 3 hours.*

Jan. 2. Stomach washed. Vomiting less. Feeding same.

*Jan. 3. Stomach washed. Vomiting ceased. Appetite better. Weight,
12 pounds 6 ozs. Gain of 3 ozs. in 2 days.*

Jan. 5. No vomiting. Feeding same.

Jan. 8. Weight, 12 pounds 9 ozs. Gain, 3 ozs.

Jan. 11. Child seems much better. Does not cry as much. Stools,

BACK OF CARD.

1 a day, yellow. Increase food to 10 ozs. milk, 6 ozs. Barley Water, Beef Juice 1 teaspoonful every other day.

Jan. 14. Weight, 12 pounds 14 ozs. Gain of 5 ozs. Feeding same.

Jan. 18. Much improved. Child sleeps better. Good appetite.

Jan. 21. Weight, 13 pounds 2 ozs. Gain of 4 ozs. Beef juice in-
creased to 2 teaspoonfuls a day.

It is of the utmost importance to have a correct history of each case. This is especially so in "feeding" cases, where the weight and food should be recorded at



Fig 1.—Cabinet for History Cards.

each visit. These cards are kept in file cases, such as are shown in Fig. 1. The cards measure 5 x 8 inches.

TEMPERATURE.

The temperature should invariably be taken in the rectum. If the child in question is not of an excitable or vicious temperament and does not seem to mind a physical examination, in such a child it is not necessary



Fig. 2.—Method of Taking Temperature.

to take the temperature the first thing. On the other hand, if the child is of an excitable or vicious temperament, the taking of the temperature should not be left until you are through with your examination of the chest and abdomen, for the child will oftentimes send his temperature up one degree by simply indulging in a hard crying spell. The position of the patient for best taking the temperature is indicated by Fig. 2. There are so-called "half-minute" thermometers, but I should advise allowing the thermometer to remain in the rectum two minutes at least. The thermometer should be vaselined before introducing it into the rectum. If the child is over four years old, he may possibly be taught to hold a thermometer in his mouth, but this is usually very unsatisfactory. The mouth temperature is always lower than that of the rectum. Do not bother a child by taking his temperature every hour. Once or twice a day, or in rare instances every three hours, is as often as it should be taken.

WEIGHT.

Weight plays an important part in the examination especially of infants. Every infant and young child should be weighed when first examined, as it is only by the observance of the weight that we can tell whether an infant is assimilating his food. A baby should be

weighed entirely naked; not even a napkin should be on him when his weight is taken. His weight should be recorded. Some cases require a daily weight; other cases require to be weighed every second or third day, while others should be weighed weekly. In older children, especially in underfed and phthisical patients, the importance of keeping a correct record of the weight cannot be overestimated.

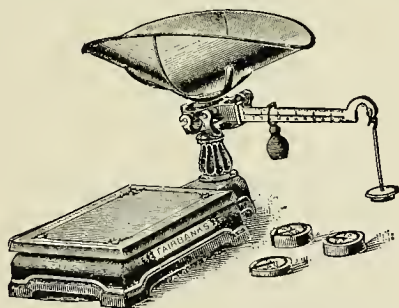


Fig. 3.—Scales for Weighing the Baby.

The best scales for weighing an infant or young child are illustrated by Fig. 3.

TO WEIGH A BABY.—Take a light, soft blanket, place it in the scales-pan, and adjust the scales so that they balance with the blanket in the pan. Note the weight of the blanket. Now undress the baby, taking everything off him, napkin and all. After removing his clothing, wrap him up in the blanket above referred to and weigh him, and do not forget to subtract

the weight of the blanket from the total weight of blanket and baby. Always balance the scales each time with the blanket in the scales-pan before weighing the baby, and always weigh the baby as described.

A baby is usually weighed just before the bath.

The average weight of a new-born baby is about seven pounds. During the first three or four days the baby loses in weight, but at the end of from seven to ten days he is back again to his birth weight. From four to seven ounces each week is a fair (average) gain for the first six months; after that the gain is relatively less. A regular gain is the ideal one. If a baby is fed entirely upon starch or prepared foods, a great and sudden gain in weight will be the result. But the child will not be as strong physically as the baby who has had a milk diet and a slow but steady gain in weight.

It is a good plan to provide oneself with a weight chart upon which a correct and intelligible record of baby's weight may be kept. The best chart which I have seen for this purpose is the one devised by Dr. Walter Lester Carr and shown in Fig. 4.

Table of Average Weight During the First Year of Life.

Birth	MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
Lbs. 7	8½	10½	12½	13¾	14¾	15¾	16½	17	17½	18	18¾	20

It will be seen by the above table that an infant gains more rapidly in weight during the first three months of life. During the second year the child gains about five pounds.

MENSURATION.

Mensuration plays an important rôle in the examination of infants and young children. A steel tape



Fig. 5.—Tape Measure.

measure, illustrated by Fig. 5, on one side of which are inches and the other side marked off in centimeters, is the best form of measure. The cloth measures are apt to stretch and are far inferior, in the author's mind, to the steel tape.

The circumference of the head in hydrocephalus (see (Fig. 6); the difference in size of the two sides of the chest measured from the center of the spine to the center of the sternum in cases of fluid in the chest; the actual length of the legs from the anterior, superior spine of



Fig. 6.—Measuring Circumference of Head.

the ilium to the internal malleolus of the tibia (Fig. 7), in hip-joint disease, or in fracture of the femur; the difference in circumference of the thigh, calf, or arm in lesions of the spinal cord; in any of these conditions the above measurements are all important.

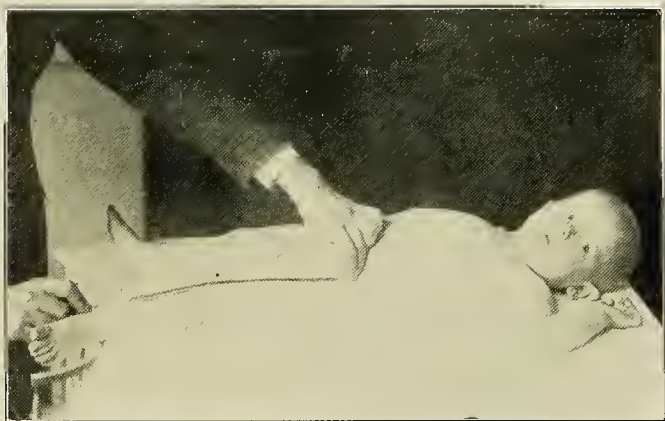


Fig. 7.—Method of Measuring Length of Leg.

INSPECTION.

THE SLEEPING CHILD.—If you are called to a case where the little patient is asleep when you arrive, do not awaken him. Generally a great deal may be learned from simply watching a sleeping child. Respiration, pulse, color, action, etc., are all best observed when the patient sleeps. Watch the alæ of the nose, see if they dilate and contract with each respiration, see if the res-

piration is regular or irregular, slow or rapid, deep or shallow. Count the pulse, and notice its rhythm and character. Notice whether the eyelids are closed or partly or wholly open. If the pupils are visible, note their character. Does the child moan, cry, or is the characteristic "pneumonic sigh" present. (This is a grunt or sigh which goes with each expiration.) Is the child cyanotic, pale or flushed, or is there a rash present? Are there convulsive movements? Is the anterior fontanelle bulging? Is the skin dry, moist, cold, or hot? Is there jaundice present. Is the child unusually quiet? Is the child a mouth-breather? Is the general *tout ensemble* of the patient that of a well child or a sick child?

THE CHILD AWAKE.—What has just been said regarding the inspection of the sleeping child will also apply to the inspection of the child that is awake. In the inspection of an infant or young child one cardinal point to my mind must be observed, viz., the child must be undressed, and by undressed I mean naked. Some physicians contend that by undressing a child one scares it unnecessarily, making it cry and thereby making the examination of the lungs more difficult. Other physicians claim that they are able to auscultate an infant's or child's chest without removing the clothing. This all may be true, but the author is satisfied that he can examine an infant or young child best when it is stark naked and therefore advises his readers to do likewise.

Watch the child for a few moments as it lies in the crib or on the nurse's lap before proceeding with your examination. Does the child move both arms and legs alike or does he favor one side more than the other? Note carefully any rash that may be present. Does the infant see or is he blind. The best method to ascertain if an infant sees is to flash a bright, shiny object, such as a match box, in front of his eyes and see if his eyes follow it. Do not use a lighted match, as this is dangerous and unnecessary. Notice whether the pupils contract to light, by covering the eye with your hand and then uncovering it, or by pulling the eyelid up and down. Oftentimes by snapping one's fingers in front of the baby's eyes we may determine whether sight is present by the fact of the infant winking or turning the eyes quickly. If the child is old enough to walk, watch him walk and see if there is a limp, bow-legs, or dragging of one foot. Watch him pick up objects from the floor; does he hold the spine rigid when he stoops (Pott's disease)? The typical rachitic baby is familiar to all. Note the size and prominence of the abdomen; are the ribs beaded or the epiphysis enlarged; is the head a square-shaped head; is there any hernia present; is the baby a plump, well-nourished baby or does he show any of the signs of malnutrition? Is there any ophthalmia? Does the child talk or is he backward? Do not forget to inspect the stools; ask to see the napkins. Notice if the stool is a yellow,

homogeneous, well digested mass, or are there many curds, or mucus, or blood present. Is the stool thick or thin? Has it a foul odor? Do the stools contain worms, or segments of tapeworm? It is often well to examine a stool under water, as then the shreds of mucus may be better differentiated from segments of tapeworm. Do not forget that a normal yellow stool may turn green on standing for a few hours.

Too little attention is given to the subject of inspection of sick infants and children. Inspection is, I believe, the most important element which we possess in the diagnosis of disease. What experienced nurse is there who cannot by long association in a baby's ward diagnose a case of pneumonia or even diarrhœa by inspection alone? I have seen pneumonia, diarrhœa, diphtheria, tonsillitis, and many other diseases of childhood diagnosed from a distance of many feet by experienced nurses from simply a cultivation of this all-important power of inspection.

PALPATION.

TO COUNT THE RESPIRATION.—In some babies it is easy to note the number of respirations per minute by inspection, watching the movements of the chest. In others, however, it is very difficult to count the exact number of respirations by this means. The best method of counting the respirations is to place the hand lightly

upon the chest of an infant or young child and note the number of times your hand rises and falls. A rise and fall of your hand is counted as one respiration. (See Fig. 8.)

The normal respirations, according to Holt, are as follows:—

The Sleeping Child.

At birth	35 per minute
At the end of one year	27 “ “
At two years	25 “ “
At six years	22 “ “
At twelve years	20 “ “

When a child is awake, his respirations are slightly more rapid than the figures given above for a sleeping child. Any slight disturbance causes all sorts of variations from the normal.

TO COUNT THE PULSE.—The infant's pulse is usually taken at the wrist. It may be counted anteriorly to the ear or at the anterior fontanelle. The normal number of heart beats per minute is given by Rotch as follows:—

Early weeks	120-140
Until the second year	110
Two to three years	100
Five to eight years	90

The act of crying always accelerates the pulse anywhere from ten to thirty beats per minute. The pressure of the physician's examining finger should be light. The rhythm, frequency, and character of the pulse

should be noted. In very weak babies it is often impossible to count the pulse except by the use of the stethoscope applied over the apex beat.



Fig. 8.—Method of Counting the Respiration.

PALPATION OF THE CHEST.—Before the physician's hands touch a child's naked body the hands should be warmed. What may we learn from the simple palpation of the infant's or young child's chest? Râles in the lungs may be felt. The mother usually can tell you

when she "feels a drawing" on her baby's chest. These râles are usually large and coarse râles. The method of palpation of the chest is shown in Fig. 9.



Fig. 9.—Palpation of Chest.

A roughened heart valve, characterized by a thrill, may be felt by palpation. Fluid in the chest, or a solid lung, may oftentimes be noted by palpation.

The sense imparted to the examining hand when held close against the skin over a solid lung or a chest

full of fluid, when once felt, is often of great value in the diagnosing of subsequent cases. Run your hand along down the spinal column and see if any curvature



Fig. 10.—Situation of Epitrochlear Gland.

exists. Examine it for tender spots. See if the child holds the neck muscles rigid. Is the spinal column mobile or is it rigid.

PALPATION OF THE EPITROCHLEAR GLAND. — This should never be neglected. This evidence of syphilis

should always be looked for. The situation of the epitrochlear gland and the method of examination are illustrated by Figs. 10 and 11.



Fig. 11.—Method of Palpating Epitrochlear Gland.

PALPATION OF THE ABDOMEN. — The examining hand should be warmed before touching the abdomen. If the child is old enough to understand, tell him to breathe deeply or to breathe hard. In infants, the best moment to palpate the abdomen is at the end of each cry-

ing spell. The abdomen should be palpated to see if there be a tumor present, such as minute tubercular nodules scatered over the peritoneum, or to see if a large single tumor exists. The course of the ascending, transverse, and descending colon should be gone over



Fig 12.—Method of Examination of Abdomen to Elicit Presence of Fluid.

to see if there are any lumps of impacted fæces therein. Tumors resulting from intussusception and appendicitis should be thought of when palpating the abdomen. A distended urinary bladder may often be felt. The presence of fluid in the abdomen is elicited by holding

one hand on one side of the abdomen and gently tapping the other side of the abdomen. (See Fig. 12.) If fluid is present, it will be felt in a transmitted wave by the other examining hand.

The abdominal wall should be palpated with regard to finding out whether it is rigid or lax. Is the abdomen enlarged or is it retracted? Are the intestines distended



Fig. 13.—Palpating the Liver.

with gas? Does it hurt the child to palpate the abdomen? Is there any enlargement of the peritoneal or retro-peritoneal glands? Do not mistake the rigid rectus muscle for a tumor. The liver and spleen should be palpated for in every case.

PALPATION OF THE LIVER.—The liver in every case should be palpated. The method of palpation of the liver is illustrated by Fig. 13. A note should be made

in the history whether the liver is palpable or whether it is felt at the free border of the ribs or one-half, one, two, or three inches below the free border of the ribs. Is the liver smooth or is it nodular?

PALPATION OF THE SPLEEN.—The spleen also should be felt for in every case. The method of palpation of the spleen is illustrated by Fig. 14.



Fig. 14.—Palpating the Spleen.

A normal spleen should not be palpable. A note should be made in the history whether the spleen is palpable or not.

PALPATION OF THE HEAD.—The presence of cranio-tabes should be sought for. Its presence is elicited by a firm but careful pressure of the examining thumb on the cranial bones. A softening of these bones indicates



Fig. 15.—Pressing Down on Head to Elicit Pain in Examination
for Pott's Disease.

cranio-tabes. The two fontanelles, anterior and posterior, should be examined and a note made of their size. Are the fontanelles bulging or depressed? Is the head of good shape? Is it rachitic, hydrocephalic, or microcephalic? Are the sutures open or is the skull prematurely ossified (as in microcephalus)? The circumfer-



Fig. 16.—Examination of Hip Joint.

ence of the head should be noted. (See Fig. 6.). At birth the average circumference of the head is about $13 \frac{1}{2}$ inches. In the development of the head its diameter keeps about the same as that of the chest. In suspicious cases of Pott's disease pressure should be made on the top of the baby's head to see if this elicits pain. (Fig. 15.)

PALPATION IN GENERAL.—In cases where hip-joint disease is suspected, a thorough examination of the hip-joint should be made, testing its mobility, limitations of motion, presence, or absence of pain. (Fig. 16.) The actual length of both legs should be taken and any shortening of the suspected side should be noted. (Fig. 7.)



Fig. 17.—Kernig's Sign. Inability to extend leg when thigh is flexed on abdomen.

Kernig's sign in meningitis should be tried. (Fig. 17.) Babinski's reflex should be looked for also in cases of meningitis. (Fig. 18.)

In chorea the patient's hands should both be held by the examining physician's hands. (Fig. 19.) The child should then be asked his name or some similar question.

In cases of chorea, just as the patient begins to speak, there is a perceptible tremor of the patient's hands. This sign is fully described by Sachs, of New York. Palpation of the cervical and inguinal regions should be made and any glandular enlargements noted. Examine the foreskin and see if there are any adhesions, or whether phimosis is present. Is there any discharge

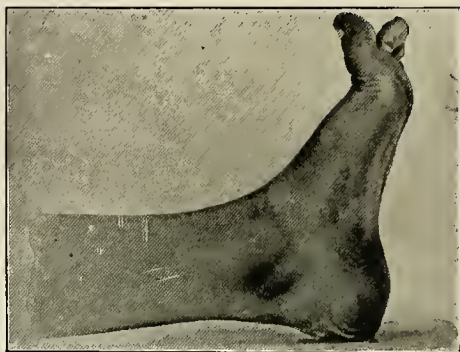


Fig. 18.—Babinski's Reflex. Extension of great toe with flexion of other toes when sole of foot is touched. Taken from Koplik's book on "Diseases of Children."

from the vulva (vulvo-vaginitis)? Are there any papillomata, fissures, or polypi in the rectum? In cases of suspected appendicitis or intussusception, a rectal examination should always be made, as by its aid the tumor may be felt. (Fig. 20.) The scrotum should be examined for hydrocele, or undescended testes. To make the diagnosis of fluids in the chest positive, an



Fig. 19.—Chorea Reflex. Upon the child pronouncing a word, a perceptible tremor of the hands is noticed.

aspirating needle (with syringe attached) should be plunged into the spot where the percussion note is the dullest, which usually is a spot just below the angle of the scapula. All antiseptic precautions should be employed in making this puncture.



Fig. 20.—Rectal (Bimanual) Examination of Abdominal Contents, especially for Tumors of Abdomen.

The best method of handling an infant is illustrated by Fig. 21. In this manner he may be carried from lap to table, or scales, without fear of injury or falling.

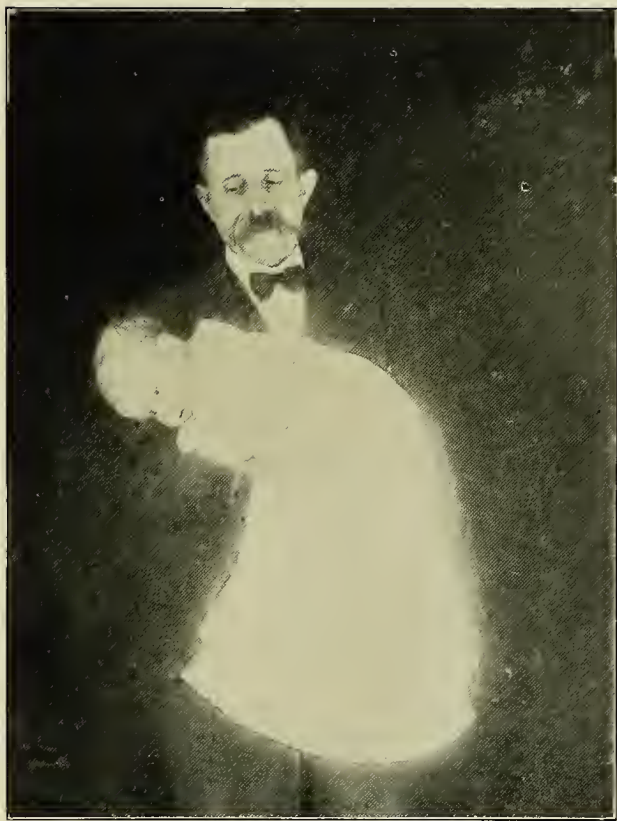


Fig. 21.—Method of Carrying an Infant.

AUSCULTATION.

Auscultation is the keynote of a proper physical examination. The man who can successfully auscultate an infant's chest and correctly interpret the sounds he hears therein is the successful diagnostician. But how few can do this! Therefore, I would beg of you to cultivate the art of auscultation.

In an auscultation of an infant's or young child's chest we must put aside all that we have learned in auscultating an adult's chest, for our task now is entirely different. There is but one way to correctly and successfully auscultate the chest of an infant or young child, and that is by the use of a stethoscope (a proper stethoscope). A spot of solid lung, no larger than a five-cent-piece, would be entirely overlooked were we to use our ear flat against the chest for auscultatory purposes. The adult ear is too large for use on an infant's chest. It takes in too much of the lung at a time. Some adult ears would almost cover one entire lung of an infant.

We see, then, that for a proper auscultation of lungs and heart in infants and young children, the use of a stethoscope is of the utmost importance. The stethoscope that the author has used is illustrated by Figs. 22 and 23. Many physicians are fond of the small phonendoscope.

The bell of the stethoscope is made of aluminum. It should be placed flat against the skin, excluding all air

and sound. The rubber tubing used in the stethoscope should be firm and not easily kinked. The earpieces



Fig. 22.—Stethoscope.



Fig. 23.—Aluminum Stethoscope Bell (Exact size).

should fit the ears. The stethoscope should always be in the physician's pocket; it is the most important article of the armamentarium of the pediatric diagnostician.

Do not lean over the patient in the act of auscultation, for in this position the eardrums become engorged with blood and our sense of hearing is thereby impaired. (Fig. 24.)



Fig. 24.—Incorrect Method of Auscultation (Examiner should *not* lean over).

AUSCULTATION OF THE LUNGS.—I would advise my readers to fully familiarize themselves with Figs. 25, 26, 27, and 28. Unless you know where the normal, healthy lungs are situated in infants or young children, you never will know the significance of pathological physical signs. It is astounding to see to what degree exists



Fig. 26.—Normal Development. Infant, eleven months old. The lower borders of the thorax, the lower borders of the lungs, and the kidneys are drawn in black. The right kidney is somewhat lower than the left. The lower border of the left lung comes down as far as the tenth rib; the lower border of the right lung comes down only to the ninth rib, on account of the size of the liver.

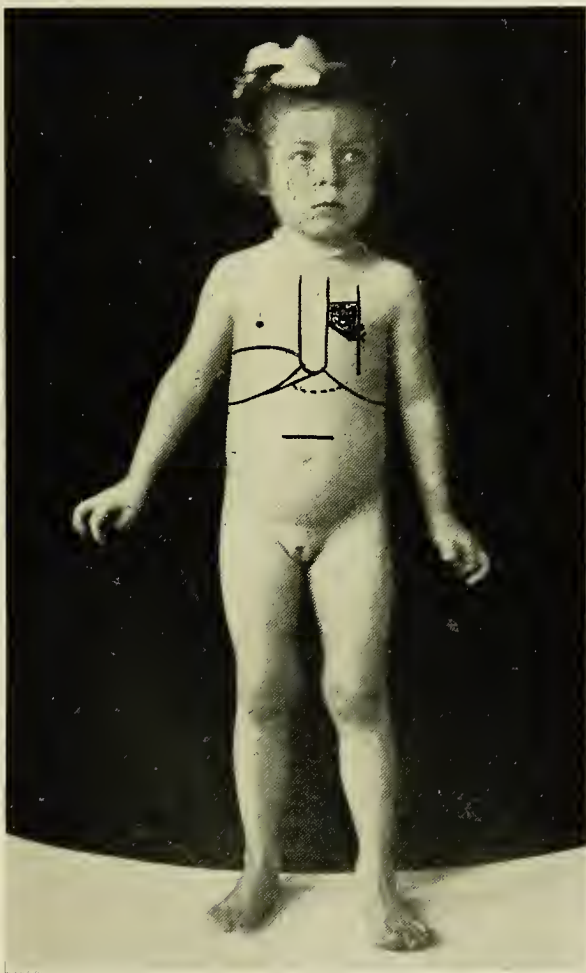


Fig. 27.—Normal Development. Child, five years old. The sternum, lower borders of the thorax, upper and lower borders of liver, transverse colon, and left nipple-line are all indicated by black lines. The apex beat of the heart is indicated by an x situated just below the nipple and on the nipple-line. The lower border of the stomach is indicated by a dotted line. The area of absolute heart dullness is indicated by a shaded area enclosed laterally between the left border of the sternum and the nipple-line, and whose upper border begins at the lower border of the third rib. This space is shaped like a truncated cone, whose apex points toward the apex beat of the heart.



Fig. 28.—Normal Development. Child, five years old. The lower borders of the thorax, the two kidneys, and the lower borders of the lungs are outlined in black. The kidneys are about at the same level. The lower border of the right lung is still higher than the lower border of the left lung, on account of the size of the liver. The base of the left lung is at level of the lower border of the tenth rib, while the base of the right lung comes down only to the level of the upper border of the tenth rib. The first dorsal and twelfth dorsal vertebræ are also marked by a small circle.

this absolute lack of knowledge of location of normal landmarks.

The position of the infant, when auscultating his lungs, is illustrated in Figs. 29 and 30. In auscultating



Fig. 29.—Correct Method of Auscultation of Infant's (Anterior) Chest.

the anterior chest, the infant should be on his back on a table or on the nurse's lap. Go over both lungs with your stethoscope anteriorly, alternating from one lung to the other; go over every inch of lung area. It is

often well, when auscultating the chest, to close the eyes and auscultate first one side and then the other; this brings out the element of nearness which is so marked a characteristic of bronchial breathing. Do not forget to auscultate in the axillæ and axillary lines. The



Fig. 30.—Correct Method of Auscultation of Infant's (Posterior) Chest.

posterior chest is gone over in the same manner as the anterior chest. A moderately strong pressure and oscillation of the stethoscope bell will cause the infant to cry. This may be made use of when you wish to note the quality of the voice.

Young children should have their lungs auscultated while standing or sitting. (Fig. 31.) Children old enough to understand will often be able with a little



Fig. 31.—Method of Auscultation of Young Child's Chest.

instruction from you to breathe deeply. Many children really do not know how to breathe. Watch the shallow, little respiration and see to what great extent the chest has been undeveloped. It is a crying shame that more

care is not given children by parents and teachers in this all-important art of proper breathing.

The base of the right lung posteriorly in infants is relatively high up on account of the normally large size of the liver. (See Fig. 26.) Do not forget this fact when making a diagnosis of "*solid lung*" or "*fluid*" in this region!

AUSCULTATION OF THE HEART. — The patient should be in the same position for auscultation of the heart as outlined under "Auscultation of the Lungs." Auscultate the heart in every case. Many a congenital malformation and other heart lesion are discovered by auscultating a heart supposed to be normal which would otherwise escape detection. Locate the apex beat, always with a stethoscope (Fig. 32), and see if it is in its normal position. A pulse so weak that you cannot feel it at the wrist may often have to be counted by the stethoscope at the apex of the heart. Notice if the heart sounds are clear or roughened. Is there a hæmic murmur present which changes from time to time: now you hear it, now you do not? Does this hæmic murmur vary with the position of the patient? Is there a murmur heard over the mitral, tricuspid, aortic, or pulmonary valves? Is it transmitted and in which way? Is there a soft blowing, systolic murmur heard all over the area of the heart which might suggest congenital heart lesion? Is there a friction sound over the pericardial area which would suggest pericarditis?



Fig. 32.—Locating the Apex Beat of Infant's Heart, by Means of the Stethoscope. The stethoscope should be applied to the chest in the order of the numbers given in the small circles, beginning over to the right and gradually bringing the stethoscope over to the left toward the point where the apex beat should normally be found (this point is marked by a black circular disc). When the point of maximum intensity is found, then commence at a point over at the left and gradually bring the stethoscope over to the right, until the same point of maximum intensity of the apex beat is located. This point of maximum intensity of sound is the apex beat.

Do not listen to a heart indefinitely, or your ear will get so confused that you will at last wonder whether there is a murmur or not.

In nervous, excitable children it may be impossible to elicit any adventitious heart sounds except by the careful application of the stethoscope during sleep.



Fig. 33.—Auscultation of Great Vessels of the Neck.

AUSCULTATION OF THE GREAT VESSELS OF THE NECK.—The great vessels of the neck should be auscultated on either side for venous, anæmic hums and transmitted murmurs. (See Fig. 33.)

PERCUSSION.

Much valuable information can be elicited by the aid of percussion in the examination of infants and young children. Many physicians prefer to use the finger as a percussion hammer, and fully as many others advocate the use of a percussion hammer. I am of the latter class and should advise you to use the percussion hammer, for the reason that I believe you will get a more even blow, and practically the same blow with each

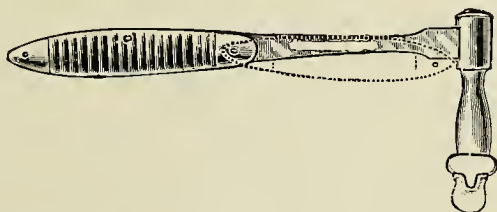


Fig. 34.—Percussion Hammer.

stroke of the hammer, while, were you using your finger, the force of the blow would vary.

The form of percussion hammer that has been in use in my own practice is illustrated in Fig. 34. This is a folding hammer and therefore may be carried in a coat pocket very readily. It should always be with you.

The force of the blow used with a percussion hammer should be much lighter than that used for the percussion of the adult, for you must remember that the chest is much thinner and more delicate in infants than

in the adult. We have seen students hammer an infant's chest when percussing it, in a manner that would suggest nail-driving rather than percussion. Do not prolong percussion. A few light taps in the right place will



Fig. 35.—Percussion of Infant's Chest (Anteriorly).

usually give you all the information that there is to be gained by this method of examination. The chest in infants is best percussed with patient on a table or lap. (Fig. 35.) Some physicians prefer the infant held in



Fig. 36.—Percussion of Young Child's Chest (Posteriorly).

the arms. (Fig. 36.) Young children's chests should be percussed while the child is standing or sitting. (Fig. 37.)



Fig. 37.—Percussion of Young Child's Chest.

PERCUSSION OF THE LUNGS.—Each lung should be percussed from apex to base, both anteriorly and posteriorly, and also in the axillary line. It is well, when percussing the back of the chest, to percuss first the right lung at its apex, then the left lung at its apex, then right lung one-eighth of the way down, then the left lung at

the same spot, and so on down the chest. In this way you can easily tell when one percussion note sounds exaggerated, dull, or flat.

Do not mistake the liver-dullness found low down on the right side in the axillary line for solid lung.

Anteriorly the chest is percussed in the same manner as posteriorly: first one side, then the other, alternating until the whole anterior chest wall has been gone over.

PERCUSSION OF THE HEART.—The boundaries of the heart should be mapped out in a case of suspected cardiac lesions or fluid in the chest. In infants, the area of cardiac dullness is very small. The location of the apex beat in children should always be found by auscultation, as already described under "Auscultation of the Heart."

In percussing for the right border of the heart, begin your strokes far over to the right and gradually come across to the left until the right border is reached. The same method holds true for percussing the base of the heart, and here, too, we commence percussing up near the clavicle and gradually work down until the base of the heart is reached. To find the left border of the heart, commence percussing far over to the left and gradually come across to the right, until you find dullness, when you then know that the left border of the heart has been reached. A pathological accumulation of pericardial fluid will give a larger area of cardiac dullness than is to be found normally.

PERCUSSION OF THE THYMUS GLAND.—Some physicians claim that they can map out by percussion the existence of an enlarged thymus gland or the presence



Fig. 38.—McEwen's Sign. Tympanitic note on percussion over lateral ventricle of brain.

of enlarged bronchial glands. The author has never been able to do it satisfactorily.

PERCUSSION OF THE ABDOMEN.—Percussion of the abdomen is less used in the examination of infants and young children than in the examination of adults, for

there is little in the abdomen to percuss that you cannot feel by palpation. A distended urinary bladder may be diagnosed by percussion. Fluid in the abdominal cavity may be diagnosed by the change in the percussion note on moving the patient from side to side. Should the stomach be dilated, or should the intestines, especially



Fig. 39.—Method of Examining Knee-Jerk.

the colon, be distended with gas, a tympanitic note over these areas will be elicited by percussion of the abdomen.

PERCUSSION OF THE HEAD.—McEwen's sign, which consists of percussion over the anterior part of the lateral ventricle of the brain with the production of a hollow note, is sometimes found to obtain in cases of meningitis, especially in the tuberculous type, where there is

accumulation of fluid in the ventricle. The manner of eliciting McEwen's sign is illustrated by Fig. 38.

THE KNEE-JERK.—The normal reflex motion of the leg, obtained by delivering a light percussion blow just below the patella, is termed the knee-jerk. This should always be examined for in cerebral and spinal cases, to ascertain whether the knee-jerk is normal, diminished, or exaggerated. The method of eliciting the knee-jerk is illustrated by Fig. 39. The child is placed on his back, the thigh (near the knee) is grasped by one hand, so that the leg hangs loose. A light tap or two is given with the percussion hammer just below the patella; in a normal knee-jerk the leg moves anteriorly from one-half to one and one-half inches.

EXAMINATION OF THE THROAT.

Whenever you examine a sick baby, always look at the throat. Many a case of diphtheria has been entirely overlooked from the lack of observation of this part of the anatomy during the routine examination of an infant or young child. The method of examination of the throat is illustrated by Figs. 40 and 41. Direct light may be used for illumination, such as a window, a gas jet, or a lamp; or the physician may use reflected light by the use of his pocket head mirror. (Illustrated by Fig. 42.) Usually sufficient light can

be had from a gas jet, lamp, or even a candle to illumine the fauces, when reflected light from the head mirror is used.



Fig. 40.—Throat Examination of Infants.

The handle of a teaspoon makes an ideal tongue-depressor.



Fig. 41.—Position Best Suited for the Examination of the Throat in Older Children.

Never fail to take a culture of all exudates in the throat. When examining the throat, always note the size of the tonsils, and, if adenoids are suspected, make a digital examination of the naso-pharynx for these growths. The method of examining for adenoids is

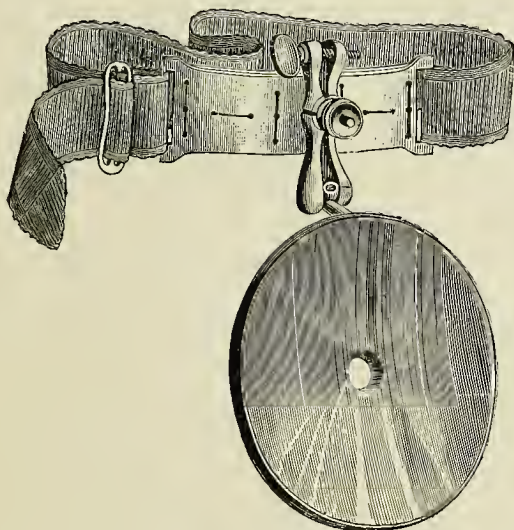


Fig. 42.—Head Mirror.

illustrated by Fig. 43. The child is placed on his back on a table, or on the nurse's lap with his head between the knees of the examining physician. The handle of a spoon is placed between his back teeth so that the child cannot bite your finger. The index finger of the right hand is now introduced into the mouth and pushed up



Fig. 43.—Method of Examination for Adenoids.

well into the naso-pharynx. If adenoids exist, their presence will be noted by their soft, spongy feel, and from the fact that they bleed easily. Do not prolong the examination for adenoids. When examining a throat note how many teeth the baby has, also the condition of the gums. Is there any sprue present? Note the condition of the tongue. Are there any defects of the palate? Is there any bulging of the posterior pharyngeal wall, suggestive of a retro-pharyngeal abscess? Is the throat pale or congested? Again, let me warn you, *never* to omit the examination of the throat.

EXAMINATION OF THE NOSE.

In the examination of the nose the same position of the patient as for throat examination will be found useful. In examining for a foreign body in the nose it is well to introduce a small, blunt probe anteriorly and note if you are able to pass it freely back into the naso-pharynx. If you cannot, a foreign body should be suspected. You will often be able to feel a foreign body by means of the probe. A small-sized nasal speculum (Figs. 44 and 45) may be used for the examination of the anterior nares of infants and young children.

Discharges from the nose should be examined bacteriologically to determine their origin. Klebs-Loeffler

bacilli should be looked for in all nasal discharges streaked with blood.

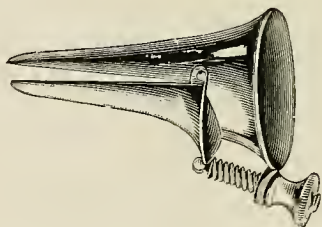


Fig. 44.—Nasal Speculum.

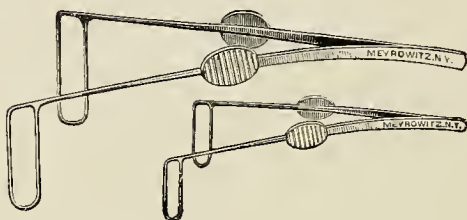


Fig. 45.—Nasal Speculum (Bosworth's).

LARYNGEAL EXAMINATION.

Laryngeal examinations in infants and young children are difficult to make, even by the throat specialist. In some instances you may be able to make them successfully in young children by the use of the laryngeal mirror, the head mirror, and reflected light. The child should sit up straight in a chair, facing the physician.

The physician should grasp the tip of the child's tongue with a piece of gauze and make slight traction on the tongue, at the same time introducing a clean and warm laryngeal mirror (Fig. 46) back to the base of the tongue. Quiet the child by comforting words—and if you get a glimpse of the larynx, you are very fortunate.



Fig. 46.—Laryngeal Mirror.

EXAMINATION OF THE EARS.

The ears should be examined in the routine examination of infants and young children. It is surprising to what a degree the examination of babies' ears is overlooked. In many a case where there is absolutely no symptom except continued fever a bulging eardrum will be found to be the only etiological factor. In a paper by Dr. Charles G. Kerley, of New York, read a few months ago before the American Pediatric Society, the author relates some thirty-three cases of serious ear disease, the only symptom of which was fever. Many cases of continued fever in babies are treated for malaria, typhoid fever, paratyphoid and chronic grippe, in which if an aural examination had been made, a bulging eardrum would have been found causing the disturbance.



Fig. 47.—Method of Examination of Ears.

Therefore, never neglect the examination of the ears in infants and young children.

The method of examining the ears is illustrated by Fig. 47. A head mirror (Fig. 42), a good light, and a proper ear speculum (Fig. 48) are required for the proper examination of the ears. Many of the ear specula, intended for adults, are absolutely worthless when used for examining the ears of infants on account of there being a bulge or shoulder at the top of the speculum which prevents its introduction far enough

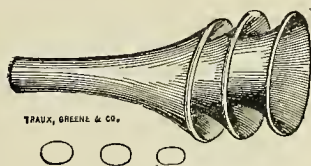


Fig. 48.—Ear Specula.

into the ear canal. The specula which the author has found to be of great service are those illustrated above.

The best view of the canal is obtained by pulling the lobe of the ear slightly downward and backward. This, as you will see, is quite the reverse to the manipulation used in adult otoscopy. This method is spoken of and highly recommended by Dr. James F. McKernon, of New York City. When the speculum is introduced and gently pushed forward into the canal, its end will often be occluded with earwax before you get a view of the eardrum. The speculum should then be removed,

cleaned, the ear canal also gently wiped with a small piece of cotton on an ear applicator, and the speculum reintroduced. Foreign bodies, such as peas, beans, etc., will often be found in the ears of infants and young children, where they have been pushed by the little patients.

EXAMINATION OF THE EYES.

To examine a baby's or child's eyes, for foreign body or disease, the child's head should be held between the knees of the physician; the hands are held by a nurse. This method enables you to hold the head firm. The eyelids are separated with the fingers.

EXAMINATION OF THE BLOOD.

The following chapter is devoted simply to the methods of procuring a specimen of blood at the bedside of the patient for a future examination. For a more extended treatise upon examination of the blood the reader is referred to any of the well-known text-books on this subject.

EXAMINATION OF FRESH BLOOD.—The lobe of the ear is the best point from which to obtain blood for examination. The ear lobe should be washed with soap and water, and then rubbed briskly with a towel to ex-

cite hyperæmia of the part. A surgical (three-sided) needle is preferable to a household sewing needle, as the surgical needle makes a larger opening and does not cause as much pain upon puncture. By a quick, downward stroke of the hand holding the needle a puncture is made in the ear-lobe. Allow the first two or three drops of blood to escape, as they are worthless. Do not use pressure to squeeze out the drops of blood, as this will dilute the blood. Inquire in all cases regarding the history of hæmophilia. Allow the third or fourth drop to remain on the ear-lobe, and when a large drop has formed, take a cover-glass and allow its center to touch the drop, but in no case let the cover-glass touch the skin. The drop will gradually spread on the cover-glass. Now let the cover-glass fall (blood downward) on a glass slide. The cover-glass and slide should be perfectly clean. Soap and water are best for cleaning them. This fresh preparation of blood is now ready to be examined through the microscope.

The above method is only useful for the examination of fresh blood, which blood should be immediately examined. Its fresh state is limited to about half an hour. If you wish to keep blood in the fresh state on a slide for a longer time, say two to six hours, the following scheme, suggested by Dr. Richard C. Cabot, is recommended: A small, hollow square or ring is painted on a slide with vaselin or oil. This square or ring should be about the size of the cover-glass. When

the cover-glass containing the drop is let fall (drop downward) in this ring or square, the drop spreads to the sides of the inclosure. A slide so prepared should be kept in a warm place of about body temperature.

EXAMINATION OF DRIED BLOOD.—This method of obtaining a specimen is used when we are obliged to keep the specimen for a longer time than a few hours,

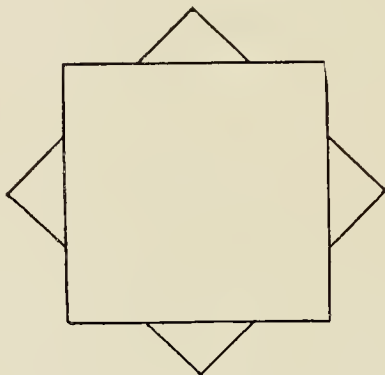


Fig. 49.

or wish to send the specimen by mail or messenger to a pathologist for examination. Two clean cover-glasses are placed side by side at the bedside of the patient. The ear-lobe is punctured as above described and a drop of blood collected on the surface of one of the cover-glasses. This cover-glass is let fall on the other cover-glass so that the corners of the glasses do not meet. (See Fig. 49.) Slide the cover-glasses apart, but do not

lift them. As soon as they are separated dry them quickly by holding them over an alcohol, gas, or lamp flame, till dry. A specimen so prepared may be kept quite some time before it is examined

HÆMOGLOBIN. — When we wish to ascertain the per cent. of hæmoglobin in the blood, we obtain a drop of fresh blood from the ear-lobe, as described above.



Fig. 50.—Gowers's Hæmoglobinometer.

We now proceed to examine this fresh specimen by the use of either Gowers's (Fig. 50) or Fleischel's (Fig. 51) hæmoglobinometer. The Gowers instrument is used for the daylight examination of blood, while the Fleischel instrument is used for artificial light examination of blood. In the Gowers instrument, sufficient blood is drawn by suction through the capillary pipette

to a certain line marked on the glass pipette. This blood is now expelled into the graduated test-tube, and decinormal salt solution added until the solution matches in color the test glycerin solution in the color tubes. The percentage of hæmoglobin is now read off on the graduated test-tube. This same principle is used in the Fleischel instrument, only in this instrument there are

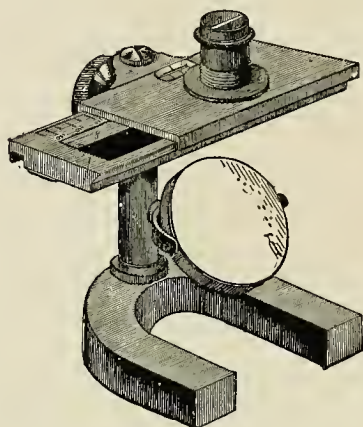


Fig. 51.—Fleischel's Hæmoglobinometer.

two cisterns side by side, one holding the blood solution, the other clear water. Under the water cistern is now introduced a wedge-shaped colored glass; this wedge is moved back and forth by means of the ratchet and wheel, until the blood solution matches the colored glass. The percentage of hæmoglobin is now read off. The Fleischel instrument is more accurate than the Gowers.

EXAMINATION OF STOMACH CONTENTS.

In feeding cases it is frequently desirable to know what the stomach is doing in the process of digestion. Especially is this so in cases of continued vomiting. We

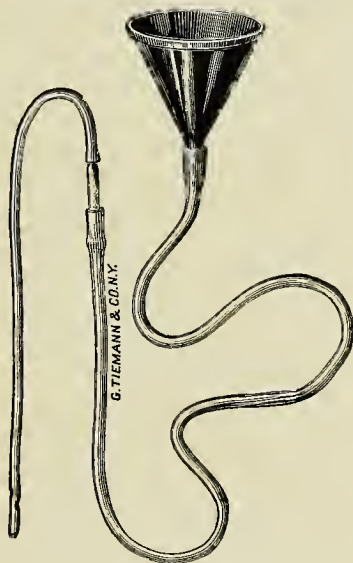


Fig. 52.—Stomach Tube (Catheter, rubber tube, glass connection, and funnel).

ascertain what work the stomach is doing regarding its assimilative powers by siphoning the contents of the infant's stomach at various intervals after feeding, examining the contents, and noting the presence or absence of curds and mucus.

Lavage in babies is easily accomplished. A soft rubber catheter (No. 20 F.) is attached by a glass connecting tube to a rubber tube about two feet long, at one end of which is a funnel. (Fig. 52.) The ordinary catheter usually has but one eye, and I have found it of advantage to make a second opening in the catheter about half an inch from the first opening to facilitate the flow of the stomach contents. This opening should be made with curved scissors, and the edges of the rubber smoothed off so as to not injure the mucous membrane of the throat, œsophagus, or stomach. Do not make the extra hole too near the already existing opening, thus weakening the strength of the tube. The attendant holds the baby as illustrated in Fig. 53. The forefinger of the physician is placed between the gums of the baby and the catheter, which has been wet in warm water, is gently pushed down the baby's throat. The distance from lips to stomach is about ten inches in infants. When the catheter reaches the stomach, the empty funnel should be raised to allow of the escape of gas. Now lower the funnel, and the stomach contents will be siphoned out. If nothing comes, manipulate the catheter, pushing it out and in. If there is still no result, raise the funnel and pour from one to three ounces of warm water into the funnel. Allow the water to flow into the stomach. If the water does not flow, manipulate the catheter by slightly drawing it out an inch and replacing it. If the water still does not flow into the



Fig. 53.—Stomach Washing.

stomach, withdraw the entire catheter and begin all over again. You will probably find the eye of the catheter plugged with curds or mucus. When withdrawing the catheter, pinch it, to prevent fluid going into larynx.

When the stomach contents have been siphoned out, examine them regarding the presence or absence of mucus and curds, and notice whether the curd is in large lumps or whether it is finely divided. Various substances *seem* to work beautifully in a *test-tube*, but they may work entirely differently in a baby's stomach!

COLLECTION OF URINE FOR EXAMINATION.

The urine of infants and young children is often quite difficult to collect. The following methods I have found very useful for collecting the urine for examination. In female infants a wad of absorbent cotton is placed over the vulva and held in place by the diaper, and examined from time to time. When it is found moist from the absorption of urine, it should be squeezed out over a vessel and the urine thus collected. A large cup placed close up against the vulva and held in place by the diaper is sometimes of advantage in collecting urine from female infants.

The catheter No. 10 F. is a sure way of collecting urine and often its use will have to be resorted to when other methods fail.

In male infants the absorbent cotton method is also useful. Still better is the application of a condom or rubber finger-cot placed over the penis (or penis and scrotum) and tied with a small tape around the waist. The child should be watched from time to time to see if he has voided any urine.

If an infant or young child of either sex is placed on a chamber occasionally and at the same time a cold hand or hot application be placed over the lower abdomen, urine will usually be soon forthcoming.

If the urine for examination has of necessity to be kept for some time before the examination can take place, it should be preserved in a corked bottle in a cool place.

For details of methods, etc., of the examination of urine, both chemical and microscopical, the reader is referred to any good book dealing with the subject of urine analysis.

SPUTUM.

Sputum for bacteriological examination for tubercular bacilli is best collected from infants and young children by passing a soft rubber catheter (20 F.) down the œsophagus, by way of the nose or the mouth, into the stomach, withdrawing the catheter and sealing it in a sterile, wide-mouthed bottle. The bottle contain-

ing the catheter is then sent to the pathologist for examination as to tubercular bacilli.

In infants and young children the mucous secretion from the lungs is always swallowed; hence the above method for the collection of sputum. In older children the above method will not be necessary, as they usually can be taught to expectorate into a sputum-cup or a wide-mouthed vessel.

LUMBAR PUNCTURE.

Lumbar puncture is used to procure cerebro-spinal fluid for diagnostic purposes and also to relieve intra-



Fig. 55.—Lumbar Puncture (Trocar and Cannula).

cranial tension. The situation of the point of puncture is usually the vertebral space above or below the fourth lumbar vertebra. This point is best located by drawing a line on a horizontal plane level with the iliac crests. The point of puncture is where this line cuts the spinal column. (Fig. 54.) A small trocar and cannula are used (Fig. 55.) Antiseptic precautions are taken for the whole field of operation and also for the instruments used. Many prefer to use a local anesthetic,

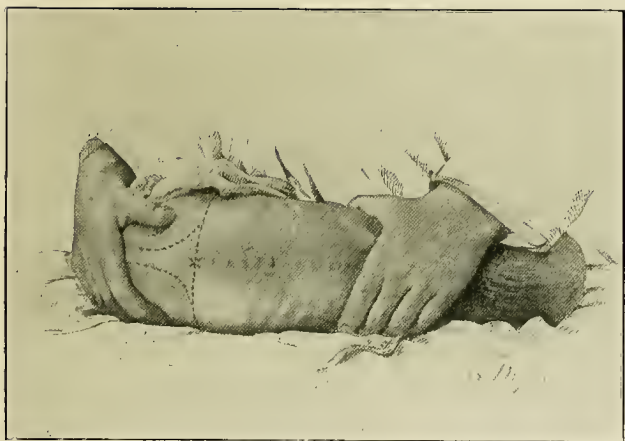


Fig. 54.—Lumbar Puncture. Point of Puncture. (*Koplik.*)



Fig. 56.—Lumbar Puncture. Introducing the Trocar. (*Koplik.*)

while others claim that none is necessary. The spine should be bent slightly so as to place the skin on the stretch and also allow a greater space between the vertebræ. The trocar should be directed upward and plunged into the canal. (Fig. 56.) The moment you feel that the end of the trocar is free, it is in the canal. Draw out the trocar and allow a few drops of fluid to escape; then allow about 30 cubic centimeters of fluid to flow into a sterile test-tube for examination. If you get no fluid, try again in twenty-four hours. The wound should be dressed with gauze and collodion.

EXAMINATION OF BREAST-MILK.

In every case where a breast-fed baby does not thrive, an examination should be made of the breast-milk.

How much milk is a breast-fed baby taking at each nursing?

That is a question which bothers many physicians. Yet it is easily answered. Weigh the baby before and after each nursing. An ounce of gain in weight means that the baby has swallowed an ounce of breast-milk. By this means we find whether a baby is getting the requisite amount of food at each feeding.

A sample of breast-milk should be expressed from the breast by means of a breast pump. The sample

should be what is termed "middle-milk," which means the milk which is taken after an ounce or so has been withdrawn (and thrown away). Never use the last portion of breast-milk, called "strippings," taken from a breast, as it is very high in fat and low in proteids.

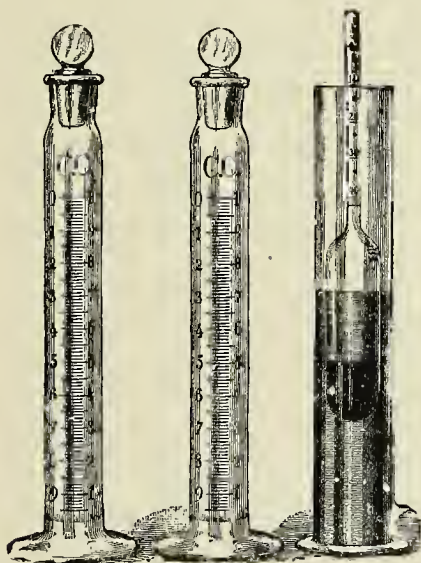


Fig. 57.—Holt's Milk Set.

(Table No. 1.) An ounce is a sufficient quantity for an examination. In some cases you will have to take what milk a mother has, as in cases of a very small breast-secretion, and not wait for the "middle-milk," of which we have above spoken. It is a far better plan to

extract the entire supply from one or both breasts, for we then will have an average of the entire specimen.

At many of the various milk laboratories one may send a sample of breast-milk and receive an approximate analysis of fats, proteids, and sugar, in a few hours. Any one who wishes to do the work himself should procure a milk-set (Fig. 57) devised by Dr. L. Emmett Holt. The reaction of fresh breast-milk should be alkaline or neutral. The specific gravity should be ascertained by means of the small lactometer which is a part of the above milk-set. The average specific gravity of breast-milk is 1.031, with variations (table No. 2). The microscopic examination of breast-milk shows colostrum corpuscles, fat globules, and granular matter. (Figs. 58 and 59.)

FAT.—The quantity of fat in a sample of breast-milk is determined by the use of the cream-gauge of the milk-set. Fill both cylinders with breast-milk up to the zero mark. Allow it to stand for twenty-four hours in a temperature of 70° and then read off the number of lines of cream. Both cylinders are used for comparison. Five lines of cream equal 3 per cent. of fat.

SUGAR.—Sugar is usually normal, and is scarcely ever deficient or increased.

PROTEIDS.—The amount of proteids is determined by the amount of fat and the specific gravity. If the specific gravity is high, the proteids also are high; if the specific gravity is low, the fat is probably high. The

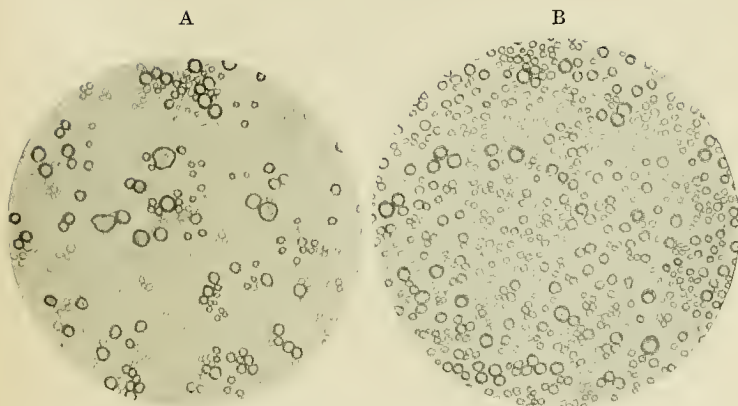


Fig. 58.—Microscopical Appearances of Woman's Milk. (After *Fleischman*.) A, Poor milk, showing preponderance of large fat globules and a paucity of fat. B, Normal milk, showing the preponderance of medium-sized fat globules.

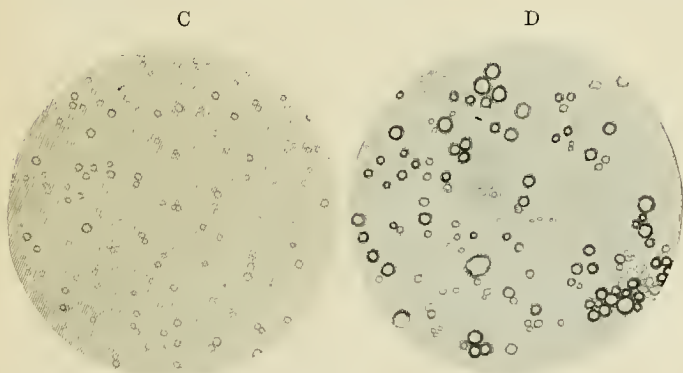


Fig. 59.—Microscopical Appearances of Woman's Milk. (After *Fleischman*.) C, Poor milk; a paucity of fat and an almost granular state of the fat globules. D, Colostrum of later pregnancy.

table given by Holt in his book on "The Diseases of Infancy and Childhood," explaining this principle, is shown below. (See Table No. 2.) :—

TABLE NO. 1.—*Breast-milk (Holt).*

	FIRST PORTION	SECOND PORTION	THIRD PORTION
	Per cent.	Per cent	Per cent.
Fat	1.71	2.77	5.51
Proteids	1.13	0.94	0.71

TABLE NO. 2.—*Woman's Milk.*

	SPECIFIC GRAVITY 70° F.	CREAM—24 HOURS	PROTEIDS (Calculated)
Average	1.031	7%	1.5%
Normal Variations }	1.028 — 1.029	8% — 12%	Normal (rich milk)
Normal Variations }	1.032	5% — 6%	Normal (fair milk)
Abnormal Variations }	Low (below 1.028)	High (above 10%)	Normal or slightly below
Abnormal Variations }	Low (below 1.028)	Low (below 5%)	Very low (very poor milk)
Abnormal Variations }	High (above 1.032)	High	Very high (very rich milk)
Abnormal Variations }	High (above 1.032)	Low	Normal (or nearly so)

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